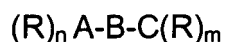


AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently amended) A process for polymerising olefins to branched polyolefins comprising contacting at least one olefin with a combination of catalysts comprising
 - (a) a polymerisation catalyst; and
 - (b) at least one co-catalyst in the form of an ethylene tetramerisation catalyst to produce 1-octene from ethylene which co-catalyst includes the combination of
 - a transition metal compound; and
 - a heteroatomic ligand described by the general formula



wherein

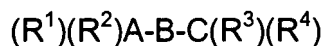
A and C are independently an atom selected from the group consisting of phosphorus, arsenic, antimony, oxygen, bismuth, sulphur, selenium and nitrogen or said atom oxidized by S, Se, N or O where the valence of A and/or C allows for such oxidation;

B is a linking group between A and C;

the R groups are the same or different, and each R is independently selected from any homo or hetero hydrocarbyl group; and

n and m for each R is independently determined by the respective valence and oxidation state of A and C; and

provided that when the heteroatomic ligand is described by the following general formula



wherein

A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen;

B is a linking group between A and C; and

R^1 , R^2 , R^3 and R^4 are independently selected from the group consisting of a hydrocarbyl group, a heterohydrocarbyl group, a substituted hydrocarbyl group and a substituted heterohydrocarbyl group; then R^1 , R^2 , R^3 and R^4 are defined by either:

- (i) ~~any substituents on~~ no one or more of R^1 , R^2 , R^3 and R^4 have a substituent that is ~~are not~~ polar; and where R^1 , R^2 , R^3 and R^4 are independently aromatic, including heteroaromatic groups, not all the groups R^1 , R^2 , R^3 and R^4 have a substituent on the atom adjacent to the atom bound to A or C; or
- (ii) at least one of R^1 , R^2 , R^3 and R^4 ~~is substituted with~~ has a polar substituent on a second or further atom from the atom bound to A or C and provided that ~~any polar substituents on~~ none of R^1 , R^2 , R^3 and R^4 ~~are not~~ has any polar substituent on the atom adjacent to the atom bound to A or C.

2. (Previously presented) The process as claimed in claim 1, wherein the olefin is ethylene and the branched polyolefin is a branched polyethylene.

3. (Previously presented) The process as claimed in claim 1 or claim 2, wherein the branched polyolefin is linear low density polyethylene.

4. (Currently amended) The process as claimed in claim 1, wherein the heteroatomic ligand of the co-catalyst is described by the general formula $(R^1)(R^2)A-B-C(R^3)(R^4)$ where A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth, and nitrogen; B is a linking group between A and C; and R^1 to R^4 are independently selected from the group consisting of a hydrocarbyl group, a heterohydrocarbyl group, and a substituted heterohydrocarbyl group, R^1 to R^4 being defined by either:

(i) ~~any substituents on~~ no one or more of R^1 , R^2 , R^3 and R^4 ~~are not have a~~ substituent that is polar; and where R^1 , R^2 , R^3 and R^4 are independently aromatic, including heteroaromatic groups, not all the groups R^1 , R^2 , R^3 and R^4 have a substituent on the atom adjacent to the atom bound to A or C; or

(ii) at least one of R^1 , R^2 , R^3 and R^4 ~~is substituted with~~ has a polar substituent on a second or further atom from the atom bound to A or C and provided that ~~any polar substituents on~~ none of R^1 , R^2 , R^3 and R^4 ~~are not~~ has any polar substituent on the atom adjacent to the atom bound to A or C.

5. (Previously presented) The process as claimed in claim 4, wherein R^1 , R^2 , R^3 and R^4 are independently selected from the group consisting of a non-aromatic group, and an aromatic group, including a heteroaromatic group.

6. (Previously presented) The process as claimed in claim 5, wherein each of R^1 , R^2 , R^3 and R^4 is independently an aromatic group, including a heteroaromatic group and not all the groups R^1 , R^2 , R^3 and R^4 have a substituent on the atom adjacent to the atom bound to A or C.

7. (Previously presented) The process as claimed in claim 6, wherein not more than two of R¹, R², R³ and R⁴ have substituents on the atom adjacent to the atom bound to A or C.

8. (Currently amended) The process as claimed in claim 4, wherein any polar substituent ~~[[on]]~~ that one or more of R¹, R², R³ and R⁴ have is electron-donating.

9. (Cancelled).

10. (Currently amended) The process as claimed in claim 1, wherein B is selected from the group consisting of an organic linking group comprising a ~~hydrocarbyl~~ hydrocarbylene, a substituted ~~hydrocarbyl~~ hydrocarbylene, ~~heterohydrocarbyl~~ a heterohydrocarbylene ~~[[and]]~~ or a substituted ~~heterohydrocarbyl~~ heterohydrocarbylene; an inorganic linking group comprising a single atom linking spacer; and a group comprising methylene, dimethylmethylene, ~~1,2-ethane~~ 1,2-ethylene, 1,2-phenylene, ~~1,2-propane~~ 1,2-propylene, ~~1,2-catechol~~ 1,2-catecholate, ~~1,2-dimethylhydrazine~~ -(CH₃)N-N(CH₃)-, -B(R⁵)-, -Si(R⁵)₂-, -P(R⁵)-, ~~[[and]]~~ or -N(R⁵)-, where R⁵ is selected from the group consisting of hydrogen, a hydrocarbyl or substituted hydrocarbyl, a substituted heteroatom, a halogen, a cyclic heteroatomic group ~~[[or]]~~ and a cyclic homoatomic group.

11. (Previously presented) The process as claimed in claim 10, wherein B is a single atom linking spacer.

12. (Previously presented) The process as claimed in claim 10, wherein B is -N(R⁵)-, wherein R⁵ is hydrogen or selected from the group consisting of alkyl, aryl, aryloxy, halogen, alkoxycarbonyl, carbonyloxy, alkoxy, aminocarbonyl, carbonylamino,

dialkylamino, or derivatives thereof, aryl substituted with any of these substituents, and any cyclic heteroatomic group including cyclopentadienyl dimethylsilyl-t-butylamidato or a cyclic homoatomic group including cyclopentadienyl, indenyl and fluorene.

13. (Currently amended) The process as claimed in claim 1, wherein at least one or both of A and/or C is independently oxidised by S, Se, N or O, where the valence of A and/or C allows for such oxidation.

14. (Currently amended) The process as claimed in claim 1, wherein at least one or both of A and/or C is independently phosphorus.

15. (Original) The process as claimed in claim 4, wherein R¹, R², R³ and R⁴ are independently selected from a group consisting of a benzyl, phenyl, tolyl, xylyl, mesityl, biphenyl, naphthyl, anthracenyl, methoxy, ethoxy, phenoxy, tolyloxy, dimethylamino, diethylamino, methylethylamino, thiophenyl, pyridyl, thioethyl, thiophenoxy, trimethylsilyl, dimethylhydrazyl, methyl, ethyl, ethenyl, propyl, butyl, propenyl, propynyl, cyclopentyl, cyclohexyl, ferrocenyl and a tetrahydrofuranyl group.

16. (Previously presented) The process as claimed in claim 4, wherein R¹, R², R³ and R⁴ are independently selected from the group consisting of a phenyl, tolyl, biphenyl, naphthyl, thiophenyl and ethyl group.

17. (Previously presented) The process as claimed in claim 1, wherein the heteroatomic ligand is selected from the group consisting of
(phenyl)₂PN(methyl)P(phenyl)₂, (phenyl)₂PN(pentyl)P(phenyl)₂,
(phenyl)₂PN(phenyl)P(phenyl)₂, (phenyl)₂PN(p-methoxyphenyl)P(phenyl)₂,
(phenyl)₂PN(p-t-butylphenyl)P(phenyl)₂, (phenyl)₂PN((CH₂)₃-N-morpholine)P(phenyl)₂,
(phenyl)₂PN(Si(CH₃)₃)P(phenyl)₂, (((phenyl)₂P)₂NCH₂CH₂)₃N,

(ethyl)₂PN(methyl)P(ethyl)₂, (ethyl)₂PN(isopropyl)P(phenyl)₂,
 (ethyl)(phenyl)PN(methyl)P(ethyl)(phenyl), (ethyl)(phenyl)PN(isopropyl)P(phenyl)₂,
 (phenyl)₂P(=Se)N(isopropyl)P(phenyl)₂, (phenyl)₂PCH₂CH₂P(phenyl)₂, (o-
 ethylphenyl)(phenyl)PN(isopropyl)P(phenyl)₂, (o-methylphenyl)₂PN(isopropyl)P(o-
 methylphenyl)(phenyl), (phenyl)₂PN(benzyl)-P(phenyl)₂, (phenyl)₂PN(1-
 cyclohexylethyl)P(phenyl)₂, (phenyl)₂PN[CH₂CH₂CH₂Si(OMe₃)]P(phenyl)₂,
 (phenyl)₂PN(cyclohexyl)P(phenyl)₂, (phenyl)₂PN(2-methylcyclohexyl)P(phenyl)₂,
 (phenyl)₂PN(allyl)P(phenyl)₂, (o-naphthyl)₂PN(methyl)P(o-naphthyl)₂, (p-
 biphenyl)₂PN(methyl)P(p-biphenyl)₂, (p-Me-phenyl)₂PN(methyl)P(p-Me-phenyl)₂, (o-
 thiophenyl)₂PN(methyl)P(o-thiophenyl)₂, (phenyl)₂PN(methyl)N(methyl)P(phenyl)₂,
 (m-Me-phenyl)₂PN(methyl)P(m-Me-phenyl)₂, (phenyl)₂PN(isopropyl)P(phenyl)₂,
 (phenyl)₂P(=S)N(isopropyl)P(phenyl)₂, and (phenyl)₂P(=S)N(isopropyl)P(=S)(phenyl)₂.

18. (Currently amended) The process as claimed in claim 1, wherein the
 heteroatomic ligand is selected from the group consisting of ((m-
 methoxyphenyl)₂PN(methyl)P(m-methoxyphenyl)₂, (p-methoxyphenyl)₂PN(methyl)P(p-
 methoxyphenyl)₂, (m-methoxyphenyl)₂PN(isopropyl)P(m-methoxyphenyl)₂, (p-
 methoxyphenyl)₂PN(isopropyl)P(p-methoxyphenyl)₂, (p-methoxyphenyl)₂PN(2-
 ethylhexyl)P(p-methoxyphenyl)₂, (m-methoxyphenyl)(phenyl)PN(methyl)P(phenyl)₂
 [[and]], (p-methoxyphenyl)(phenyl)PN(methyl)P(phenyl)₂, (m-
 methoxyphenyl)(phenyl)PN(methyl)P(m-methoxyphenyl)(phenyl), (p-
 methoxyphenyl)(phenyl)PN(methyl)P(p-methoxyphenyl)(phenyl), (m-
 methoxyphenyl)₂PN(methyl)P(phenyl)₂ and (p-methoxyphenyl)₂PN(methyl)P(phenyl)₂,
 (p-methoxyphenyl)₂PN(1-cyclohexylethyl)P(p-methoxyphenyl)₂, (p-

methoxyphenyl)₂PN(2-methylcyclohexyl)P(*p*-methoxyphenyl)₂, (*p*-methoxyphenyl)₂PN(decyl)P(*p*-methoxyphenyl)₂, (*p*-methoxyphenyl)₂PN(pentyl)P(*p*-methoxyphenyl)₂, (*p*-methoxyphenyl)₂PN(benzyl)P(*p*-methoxyphenyl)₂, (*p*-methoxyphenyl)₂PN(phenyl)P(*p*-methoxyphenyl)₂, (*p*-fluorophenyl)₂PN(methyl)P(*p*-fluorophenyl)₂, (*p*-dimethylamino-phenyl)₂PN(methyl)P(*p*-dimethylamino-phenyl)₂, (*p*-methoxyphenyl)₂PN(allyl)P(*p*-methoxyphenyl)₂, (*p*-(*p*-methoxyphenyl)-phenyl)₂PN(isopropyl)P(*p*-(*p*-methoxyphenyl)-phenyl)₂ and (*p*-methoxyphenyl)(phenyl)PN(isopropyl)P(phenyl)₂.

19. (Previously presented) The process as claimed in claim 1, wherein the polymerisation catalyst is selected from the group consisting of a Ziegler-Natta catalyst, an unbridged metallocene, a half sandwich metallocene, a carbon-bridged metallocene and a silyl-bridged metallocene.

20. (Previously presented) The process as claimed in claim 19, wherein the Ziegler-Natta catalyst is selected from the group consisting of TiCl₃-Et₂AlCl and AlR₃-TiCl₄.

21. (Original) The process as claimed in claim 19, wherein the unbridged metallocene is selected from the group consisting of:

bis(cyclopentadienyl)chromium(II),
 bis(cyclopentadienyl)-zirconium Chloride hydride,
 bis(cyclopentadienyl)-titanium dichloride,
 bis(cyclopentadienyl)-zirconium dichloride,
 bis(cyclopentadienyl)-zirconium dimethyl,
 bis(*n*-butylcyclopentadienyl)-zirconium dichloride,

bis(*n*-dodecylcyclopentadienyl)-zirconium dichloride,
bis(ethylcyclopentadienyl)-zirconium dichloride,
bis(iso-butylcyclopentadienyl)-zirconium dichloride,
bis(isopropylcyclopentadienyl)-zirconium dichloride,
bis(methylcyclopentadienyl)-zirconium dichloride,
bis(*n*-octylcyclopentadienyl)-zirconium dichloride,
bis(*n*-pentylcyclopentadienyl)-zirconium dichloride,
bis(*n*-propylcyclopentadienyl)-zirconium dichloride,
bis(trimethylsilylcyclopentadienyl)-zirconium dichloride,
bis(1,3-bis(trimethylsilyl)cyclopentadienyl)-zirconium dichloride,
bis(1-ethyl-3-methylcyclopentadienyl)-zirconium dichloride,
bis(pentamethylcyclopentadienyl)-zirconium dichloride,
bis(pentamethylcyclopentadienyl)-zirconium dimethyl,
bis(1-propyl-3-methylcyclopentadienyl)-zirconium dichloride,
bis(4,7-dimethylindenyl)-zirconium dichloride,
bis(indenyl)-zirconium dichloride,
bis(2-methylindenyl)-zirconium dichloride,
bis(2-methylindenyl)-zirconium dichloride, and
cyclopentadienylindenyl-zirconium dichloride.

22. (Original) The process as claimed in claim 19, wherein the half sandwich metallocene is selected from the group consisting of:

cyclopentadienyl-zirconium trichloride,
pentamethylcyclopentadienyl titanium trichloride,

pentamethylcyclopentadienyl-titanium Trimethoxide,
pentamethylcyclopentadienyl-titanium Trimethyl,
pentamethylcyclopentadienyl-zirconium trichloride,
tetramethylcyclopentadienyl-zirconium trichloride, and
1,2,4-trimethylcyclopentadienyl-zirconium trichloride.

23. (Original) The process as claimed in claim 19, wherein the carbon-bridged metallocene is selected from the group consisting of:

diphenylmethylidene(cyclopentadienyl)-(9-fluorenyl)-zirconium dichloride,
diphenylmethylidene(cyclopentadienyl)-(indenyl)-zirconium dichloride,
iso-propylidenebis(cyclopentadienyl)-zirconium dichloride,
iso-propylidene(cyclopentadienyl)(9-fluorenyl)-zirconium dichloride, and
iso-propylidene(3-methylcyclopentadienyl)-(9-fluorenyl)-zirconium dichloride.
ethylene-bis(9-fluorenyl)-zirconium dichloride,
meso-ethylene-bis(1-indenyl)-zirconium dichloride,
rac-ethylene-bis(1-indenyl)-zirconium dichloride,
rac-ethylene-bis(1-indenyl)-zirconium dimethyl,
rac-ethylene-bis(2-methyl-1-indenyl)-zirconium dichloride, and
rac-ethylene-bis(4,5,6,7-tetrahydro-1-indenyl)-zirconium dichloride

24. (Original) The process as claimed in claim 19, wherein the silyl-bridged metallocene is selected from the group consisting of:

dimethylsilyl-bis(cyclopentadienyl)-zirconium dichloride,
dimethylsilyl-bis(9-fluorenyl)-zirconium dichloride,
rac-dimethylsilyl-bis(1-indenyl)-zirconium dichloride,

meso-dimethylsilyl-bis(2-methylindenyl)-zirconium dichloride,
rac-dimethylsilyl-bis(2-methylindenyl)-zirconium dichloride,
rac-dimethylsilyl-bis(tetrahydroindenyl)-zirconium dichloride,
dimethylsilyl-bis(tetramethylcyclopentadienyl)-zirconium dichloride,
diphenylsilyl(cyclopentadienyl)(9-fluorenyl)-zirconium dichloride, and
diphenylsilyl-bis(indenyl)hafnium dichloride.

25. (Previously presented) The process as claimed in claim 1, wherein branched polymers in the form of polyolefins are formed by means of a tandem tetramerisation due to the co-catalyst and a polymerisation process due to the polymerisation catalyst.

26. (Cancelled).

27. (Previously presented) The process as claimed in claim 25, wherein the tandem tetramerisation and polymerisation process is an *in-situ* concurrent catalysis process and wherein tetramerisation and polymerisation takes place in the same reaction medium.

28. (Previously presented) The process as claimed in claim 25, wherein the tandem tetramerisation and polymerisation process is an *in situ* consecutive catalysis process and wherein tetramerisation and polymerisation takes place in the same reaction medium.

29. (Previously presented) The process as claimed in claim 25, wherein the tandem tetramerisation and polymerisation process is an *in situ* catalysis process, wherein the olefin in the form of ethylene is tetramerised using the co-catalyst to produce 1-octene and the 1-octene is copolymerized *in situ* with ethylene using the

polymerisation catalyst and wherein tetramerisation and polymerisation takes place in the same reaction medium .

30. (Previously presented) The process as claimed in claim 29, wherein the polymerisation catalyst includes a transition metal.

31. (Previously presented) The process as claimed in claim 1, which includes the step of combining the heteroatomic ligand with the transition metal compound and an activator in the presence of the polymerisation catalyst.

32. (Original) The process as claimed in claim 31, wherein the transition metal of the transition metal compound is selected from the group consisting of chromium, molybdenum, tungsten, titanium, tantalum, vanadium and zirconium.

33. (Original) The process as claimed in claim 32, wherein the transition metal of the transition metal compound is chromium.

34. (Previously presented) The process as claimed claim 1, wherein the transition metal compound of the co-catalyst is selected from the group consisting of an inorganic salt, an organic salt, a coordination complex and organometallic complex.

35. (Original) The process as claimed in claim 34, wherein the transition metal compound is selected from the group consisting of chromium trichloride tris-tetrahydrofuran complex, (benzene)-tricarbonyl chromium, chromium (III) octanoate, chromium (III) acetylacetonate, chromium hexacarbonyl and chromium (III) 2-ethylhexanoate.

36. (Original) The process as claimed in claim 35, wherein the transition metal compound is selected from the group consisting of chromium (III) acetylacetonate and chromium (III) 2-ethylhexanoate.

37. (Previously presented) The process as claimed in claim 1, wherein the transition metal of the transition metal compound and the heteroatomic ligand are combined to provide a transition metal/ligand molar ratio from about 0.01:100 to 10 000:1.

38. (Previously presented) The process as claimed in claim 1, wherein the co-catalyst includes an activator selected from the group consisting of an organoaluminium compound, an organoboron compound, an organic salt, an inorganic acid and an inorganic salt.

39. (Original) The process as claimed in claim 38, wherein the activator is an alkylaluminoxane.

40. (Currently amended) The process as claimed in claim 39, wherein ~~the transition metal of the transition metal compound of the co-catalyst and the~~ aluminoxane are combined in a proportion to provide an Al/transition metal molar ratio from about 1:1 to 10 000:1.

41. (Previously presented) The process as claimed in claim 1, wherein the heteroatomic ligand and the transition metal compound of the co-catalyst are combined at any temperature between -20°C and 250°C in the presence of the olefin.

42. (Previously presented) The process as claimed in claim 1, wherein the co-catalyst and polymerisation catalyst are combined in the molar ratio of 0.01:100 to 10000:1.

43. (Previously presented) The process as claimed in claim 1, which is carried out in an inert solvent.

44. (Previously presented) The process as claimed in claim 1, wherein the olefin is ethylene which is contacted with the combination of catalysts at a pressure of more than 100 kPa (1 barg).

45. (Previously presented) The process as claimed in claim 1, wherein the polymerisation catalyst and the co-catalyst are mixed at any temperature between - 20°C and 250°C in the presence of the olefin.

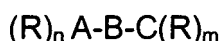
46. (Previously presented) The process as claimed in claim 1, where the process is carried out in a combination of reactors, the first reactor being a continuous stirred tank reactor and the second reactor being selected from the group consisting of a batch reactor, a continuous stirred tank reactor and a plug flow reactor.

47. (Currently amended) A catalyst combination comprising

(a) a polymerisation catalyst; and

(b) at least one co-catalyst in the form of an ethylene tetramerisation catalyst to produce 1-octene from ethylene which co-catalyst includes the combination of

- a transition metal compound; and
- a heteroatomic ligand described by the general formula



wherein

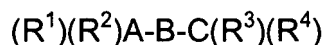
A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, oxygen, bismuth, sulphur, selenium and nitrogen;

B is a linking group between A and C;

the R groups are the same or different, and each R is independently selected from any homo or hetero hydrocarbyl group; and

n and m for each R is independently determined by the respective valence and oxidation state of A and C; and

provided that when the heteroatomic ligand is described by the following general formula



wherein

A and C are independently selected from the group consisting of phosphorus, arsenic, antimony, bismuth and nitrogen;

B is a linking group between A and C; and

R^1 , R^2 , R^3 and R^4 are independently selected from the group consisting of a hydrocarbyl group, a heterohydrocarbyl group, a substituted hydrocarbyl group and a substituted heterohydrocarbyl group; then R^1 , R^2 , R^3 and R^4 are defined by either:

- (i) ~~any substituents on~~ no one or more of R^1 , R^2 , R^3 and R^4 have a substituent that is ~~are not~~ polar; and where R^1 , R^2 , R^3 and R^4 are independently aromatic, including heteroaromatic groups, not all the groups R^1 , R^2 , R^3 and R^4 have a substituent on the atom adjacent to the atom bound to A or C; or
- (ii) at least one of R^1 , R^2 , R^3 and R^4 ~~is substituted with~~ has a polar substituent on a second or further atom from the atom bound to A or C and provided that ~~any polar substituents on~~ none of R^1 , R^2 , R^3 and R^4 ~~are not~~ has any polar substituent on the atom adjacent to the atom bound to A or C.